JBUON 2018; 23(1): 143-149
ISSN: 1107-0625, online ISSN: 2241-6293 • www.jbuon.com
E-mail: editorial_office@jbuon.com

ORIGINAL ARTICLE

Comparison of two public sector tertiary care hospitals' management in reducing direct medical cost burden on breast carcinoma patients in Lahore, Pakistan

Imran Hameed Khaliq[1], Hafiz Zahid Mahmood[2], Naveed Akhter[3], Muhammad Danish Sarfraz[4], Khadija Asim[1], Khalid Masood Gondal[5]

[1]Department of Public Health, University of Health Sciences, Lahore, Pakistan; [2]Department of Management Sciences, COMSATS Institute of Information Technology, Lahore, Pakistan; [3]Department of Anatomy, Rai Medical College, Sargodha, Pakistan; [4]Department of Radiology, Shifa International Hospital, Islamabad, Pakistan; [5]Department of Surgery, King Edward Medical University/Mayo Hospital, Lahore, Pakistan

Summary

Purpose: *Breast cancer is one of the major causes of death incurring highest morbidity and mortality amongst women of Pakistan. The purpose of this study was to assess and compare the role of two public sector tertiary care hospitals' management in reducing out of pocket (OOP) expenses on direct medical costs borne by breast carcinoma patients' household from diagnosis through treatment. Moreover, the study intended to explore the reasons of opting private diagnostic facilities by the said patients during the services taken from the foresaid tertiary care centers.*

Methods: *A purposive sample of 164 primary breast carcinoma patients was recruited for data collection of this cross-sectional study. Face to face interviews and semi-structured questionnaires were adopted as method of data gathering tools. Major cost components of direct medical costs were used to compare the financial strain on the patients' households of both targeted hospitals. In addition, information was collected regarding the reasons of opting private diagnostic centers for investigations. Frequency, percentages, median and inter quartile range (IQR) were calculated for the data. Non-parametric variables were compared using the Mann-Whitney U test.*

Results: *It was observed that overall direct medical cost borne by the breast carcinoma patients' households in Jinnah hospital (median US$1153.93 / Rs. 118,589) was significantly higher than Mayo hospital (median US$427.93 /Rs. 43,978), p<0.001; r=0.623. Moreover, spending on almost all of the components of direct medical cost were found smaller in case of Mayo hospital's patients as compared to Jinnah hospital.*

Conclusion: *This study indicates that OOP direct medical cost burden was found considerably less in Mayo hospital as compared to Jinnah hospital. The OOP expenditures on chemotherapy were overwhelmingly high. However, high spending on privately opted investigations procedures was the common issue of the patients under treatment in both hospitals.*

Key words: *breast neoplasms, direct service costs, health expenditures, tertiary healthcare*

Introduction

The likelihood of a Pakistani woman being diagnosed with breast cancer is one in nine at some stage of her life [1]. Breast cancer is one of the major causes of death with highest morbidity and mortality amongst women of Pakistan [2], as approximately 90,000 new cases are diagnosed every year [3]. Breast cancer mortality rates in Pakistan (southern Asia), the Bahamas (the Caribbean), Fiji

Correspondence to: Imran Hameed Khaliq, Lecturer (Health Economics). Department of Public Health, University of Health Sciences, Khayaban-e-Jamia Punjab, 54600, Lahore, Pakistan.
Tel: +92 3227171089, E-mail: imranham90@gmail.com & imranhameed@uhs.edu.pk
Received: 10/10/2017; Accepted: 07/11/2017

(Pacific Islands), and Nigeria (sub-Saharan Africa) are among the highest in the world [4]. Furthermore, breast cancer mortality for females in Pakistan was reported as high as 16,170 deaths per annum [5].

Non-communicable diseases require enduring management. These are such a type of chronic diseases which require a lot of diagnostic and treatment expenses [6]. OOP payment is the primary and dominant mode of financing healthcare in developing countries [7], like Pakistan [8], where almost 29.5% (i.e. 60 million) people live below the poverty line [9]. Currently, per capita income of the country is US$1,560.7 [9]. Moreover, OOP expenses account for 54.9% of total expenditures on health [10]. These outlays are made for treatment in private hospitals and clinics, and also for unofficial payments for healthcare at the government facilities in order to get faster or better care [11]. However, public health expenditure per capita health was estimated at US$35.15 in 2014 in the country [10].

In Pakistan, public sector healthcare infrastructure for breast cancer treatment through diagnosis is insufficient [12], and in several cases, the cost of illness is borne by the patient's household, wholly or partially [13]. The median monthly cost of cancer treatment was reported to be US$946.42 in a tertiary care hospital of Karachi, Pakistan [13]. However, a common cancer (i.e. head and neck) treatment in India usually costs between US$272.73 – 363.64 a month in government hospitals [14], whereas, a study conducted in a public sector hospital of Iran found ascending direct medical cost (US$115.11, 121.41, 197.82 and 735.20) per patient per month from stage I to IV, respectively [15].

The public health service delivery is primarily a provincial matter in Pakistan and its funding comes through annual health budget allocations. However, healthcare sector has always been ignored to receive less than 1% share of gross domestic product (GDP) [16]. Despite this meager budget, 85% of its proportion is spent on tertiary healthcare [17]. On average, a major proportion of this funding (61%) goes to administrative cost (i.e. salaries) [18], while a smaller proportion is invested on the consumables and supplies leading to a downward spiral of quality of health care services [18]. Moreover, the money allocated to different hospitals with the same bed strength vary from each other [18]. Consequently, patients of the public have to bear substantial OOP expenditures during diagnosis and treatment procedures in these public sector hospitals.

It is generally assumed in Pakistan that users of public tertiary healthcare already spend sizeable amounts OOP to obtain supposedly 'free services'. To our knowledge, there is no information available on the extent and the reasons for the direct expenses incurred by the breast carcinoma patient's household of public tertiary health care and the role of concerning hospital management to cater these issues. Therefore, this study was aimed to assess and compare the role of two public sector tertiary care centers' management i.e. Mayo and Jinnah hospitals located in Lahore in reducing OOP expenses on direct medical costs borne by breast carcinoma patients' household from diagnosis through treatment. Moreover, the study intended to identify the reasons of opting private diagnostic facilities by the said patients during the services taken from the aforesaid tertiary care centers.

Methods

This cross-sectional study was conducted in Lahore, the provincial capital of Punjab, Pakistan. It is the 2nd largest city of Pakistan after Karachi with more than 9 million population [19]. The city contains only two major public sector tertiary care hospitals (i.e. Jinnah and Mayo), providing all types of cancer care including breast cancer. As these setups provide cancer care to most patients belonging to all socioeconomic strata across the province of the Punjab. Therefore, participants were sampled from these two hospitals.

The survey was approved by the Institutional Review Board of the King Edward Medical University, Lahore. The study took place between August and December 2015 in Oncology Wards and Chemotherapy Departments of the target hospitals. Patients were included in this study only if they were (i) 18 years of age or older; (ii) female; (iii) diagnosed with a primary breast cancer at any stage that had been under treatment from at least three months to maximum two years [20]. However, patients who were taking any of the chemotherapy, radiotherapy and surgery services from any other cancer care facility center than the targeted hospitals were excluded from the study. Moreover, TNM staging system (i.e. stage I, II, III, IV) recommended by American Joint Committee on Cancer (AJCC) was adopted which is one of the most commonly systems used to define the different stages of this disease [21].

According to the oncologists and the administration of the targeted hospitals, 55 and 65 follow up breast cancer patients on average visit Jinnah and Mayo hospitals every month, respectively. By using purposive sampling technique, only patients fulfilling the inclusion / exclusion criteria during the study period of four months were interviewed for this study. In total 164 breast cancer patients were assessed by targeting proportionate sample from Jinnah (45.73%) and Mayo (54.27%) hospital owing to differences in patients' turnover in both cancer care facilities. A semi-structured questionnaire was drafted, pilot-tested on 10 breast cancer patients,

refined and finally used for data collection purpose from the target respondents.

Data were collected related to socioeconomic/demographic characteristics, overall direct medical costs including investigation expenditures, chemotherapy, surgery, radiotherapy costs etc. Investigations included ultrasound, fine-needle aspiration cytology (FNAC), core biopsy (CB), mammography, bone scan, x-rays, magnetic resonance imaging (MRI) and PET scan. In addition, an open-ended question assessed the information regarding the reasons of opting private diagnostic centers for investigations.

Statistics

As far as data analysis tools of the study is concerned, descriptive statistics were rendered for the key variables (i.e. patient age, patient education, marital status, monthly household income, stage of breast cancer) by estimating frequencies, percentages and measures of central tendencies. It is worth mentioning here that overall direct medical cost was also calculated along with per month median cost in the aforesaid tertiary care hospitals. Moreover, Shapiro-Wilk test was applied to know the normality of data. Based on the distribution of the data, Mann-Whitney U test was employed to estimate the differences of the association between the targeted hospitals and direct medical costs borne by breast cancer patients' households. Furthermore, the effect size was also calculated to explore the standardized measure of the size of the effect between the groups. The mathematical expression was used to convert a z-score into the effect size, which is as follows:

$$r = \frac{z}{\sqrt{N}}$$

where, r is the effect size, z is the z-score and N is the size of the study (i.e. the number of total observations) [22].

Analyses were performed using the Statistical Package for Social Sciences (SPSS 22) and a p value <0.05 was considered as statistically significant.

Results

The medical records of 237 patients were assessed but only 164 patients amongst them had been found appropriate to be included as respondents. Moreover, the response rate of the study was 100%. Table 1 exhibits the descriptive analysis of demographic attributes and breast cancer stages of the target patients. The Table shows that patient ages ranged from 22 to 65 years (median 45.00, IQR 14.00) with most of them being married (84.10%) and having no education. For those patients who were married, their husbands had completed more than 8 years of education ranging from 0 to 16 years (median 8.00, IQR 10.00). It was observed that most of the target patients were diagnosed in advanced disease stages i.e. stage III (58.5%) and IV (25.0%), while fewer patients (16.5%) were found collectively in early stages i.e. I and II. It was also noticed that participants of the study belonging to Jinnah hospital were diagnosed with breast carcinoma at minimum 3 and at maximum 20 months (median 5.00, IQR 3.00), while this minimum and maximum diagnostic period was 3 and 21 months (median 5.00, IQR 4.00) in Mayo hospital, prior to the survey.

Moreover, Figure 1 displays the major components of overall direct medical cost borne by the breast cancer patients in target public sector tertiary care hospitals. The Figure exclaims

Table 1. Demographic/medical characteristics of target respondents (n=164)

Characteristics	*Range*	*Median (IQR)*	*Frequency*	*Percentage*
Patients' age (years)	22 – 65	45.0 (14.0)	-	-
Patients' education (years)	0 – 16	0.0 (9.5)	-	-
Patient husbands' education*	0 – 16	8.0 (10.0)	-	-
Monthly household income (US$)	0 – 1167.7	146.0 (171.5)	-	-
Marital status				
Married	-	-	138	84.1
Unmarried	-	-	3	1.8
Separated	-	-	3	1.8
Widowed	-	-	20	12.2
Breast cancer stages				
Stage II	-	-	27	16.5
Stage III	-	-	96	58.5
Stage IV	-	-	41	25.0

*Patient husband education, n = 143

that moderate differences were observed between spending on investigations (Jinnah=US$206.28, Mayo=US$186.34) and surgery (Jinnah=US$145.95, Mayo=US$48.65), in both hospitals. The study revealed that spending by the patients on radiotherapy was same (i.e. zero) in both cancer care facilities. However, spending on chemotherapy was found extremely higher (median: US$467.05) by the patients of Jinnah hospital which is about 50 times as compared to Mayo hospital's patients (median: US$9.34). In addition, the median direct services cost per patient per month was also calculated. Spending on investigations (US$41.26), surgery (US$29.19), and chemotherapy (US$93.4) in Jinnah hospital were found considerably higher as compared to expenditures on investigations (US$37.27), surgery (US$9.73), and chemotherapy (US$1.87) in Mayo hospital, respectively.

It was observed that, while seeking treatment from public sector facilities, target patients took service from private outlets for investigations. In this regard, following salient reasons of opting private services for investigations were revealed (Table 2) by the Jinnah hospital patients: (a) delay in issuance of medical reports (74.67%), (b) long distance of investigation facility center from patients' residential address (54.7%), (c) doctor rejected the public-sector facility center reports due to poor

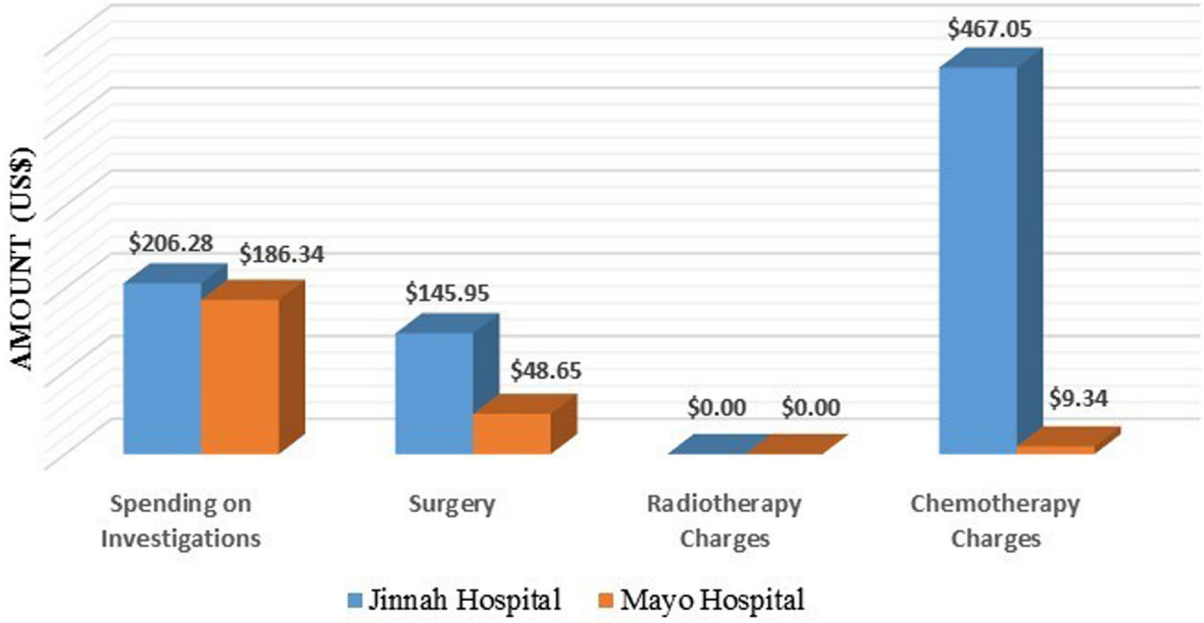

Figure 1. Major components of direct medical costs in tertiary care hospitals (US$).

Table 2. Frequency of reasons for opting private investigations facilities (n=164)

	Jinnah hospital (n=75)		*Mayo hospital (n=89)*	
Reasons	*Frequency*	*Percentage*	*Frequency*	*Percentage*
Delay in issuance of medical reports	56	74.67	28	31.46
Long distance of investigation facility center from residential address	41	54.70	21	23.60
Doctor rejected the public sector facility center reports due to poor quality	25	33.33	62	69.66
Unavailability of the test facility due to out-of-order machines	16	21.30	5	5.60
Unavailability of diagnostic facilities at the hospital	3	4.00	19	21.30
Staff misbehavior with patients' household	2	2.70	2	2.20
Unaware of test services availability in tertiary care hospital	8	10.70	24	27.00
Referred by laboratory staff	7	9.30	1	1.10
Affordability of procedures expenditures	6	8.00	0	0.00

quality (33.33%), (d) machines (e.g. MRI) being out of order at public sector facility etc. However, Mayo hospital's patients availed private investigation facilities due to the following major reasons: (a) poor quality of report/referred by the doctor (69.66%), (b) delay in issuance of report (31.46%), (c) unaware of test services availability in tertiary care hospital (27.0%).

Moreover, Mann-Whitney U test was used to observe the statistical differences of association between target tertiary care hospitals and direct medical cost borne by breast carcinoma patients' households. It was observed that overall direct medical cost borne by the target patients' households in Jinnah hospital (median: US$1153.93 / Rs. 118,589) was significantly higher than Mayo hospital (median US$427.93 / Rs. 43,978), U=921.00, z=-7.976, p<0.001, r=0.623. Moreover, direct medical cost per month per patient was also calculated in Jinnah (US$230.79 / Rs. 23,718) and Mayo hospital (US$85.59 / Rs. 8795.67), respectively. Moreover, the effect size was calculated to explore the standardized measure of the size of the effect between the groups. The r-value represents a huge effect for the direct medical cost data (as the effect size is well above the 0.5, the threshold for a large effect.

Discussion

The prognosis of treatment depends upon baseline investigations. It helps the oncologist to decide whether to provide curative or palliative care based on the severity of the condition and stage of breast cancer. Curative and palliative care are thereafter provided in the form of surgery, chemotherapy, radiotherapy or their combinations.

In the case of Jinnah and Mayo hospital, it was learnt by the authors that there were huge differences in overall direct medical cost between two tertiary care hospitals. However, the median monthly cost burden of public sector tertiary care hospitals in Pakistan (Jinnah=US$230.79, Mayo=US$85.59) was significantly lower than other alike economies i.e. India (US$272.73 – 363.64) [14] and Iran (US$447.56) [15]. There might be two reasons for these significant differences within the economy, either it was mainly due to the availability of highly subsidized facilities for cancer care in Pakistan or it might be apparently low due to differences in per capita income. At a quick glance, it was revealed that currently per capita income of Pakistan is US$1434.7 [23]. On the contrary, GDP per capita income of India and Iran is US$1598.3 and US$5442.9, respectively [23]. So, it's quite clear from the aforesaid comparison that lesser burden is still unaffordable with respect to per capita income in Pakistan.

The study revealed that most of the investigations were undertaken in the private diagnostic facility centers outside the hospitals due to multiple factors (i.e. out of order machines, poor quality of reports, delayed report results etc.), therefore, patients of both hospitals had to bear very high cost (Jinnah=US$206.28, Mayo=US$186.34) following investigations. Apparently, the cost differences were not significantly different from each other. It was also found that investigations were highly subsidized in target tertiary care hospitals but not completely free of cost. However, PET scan was not available in both targeted hospitals and bone scan was only available in Mayo hospital. Moreover, the Government of Pakistan spends only 0.45% of its GDP on health, which is extremely low. It eventually leads to an inability [24] of the government to provide the required medicines and laboratory support to health care system resulting in an OOP expenditure on health, which is around 86% [10]. In India, a researchers' team found that spending on cancer investigations was US$304.35 on average in government hospitals [14]. The study further stressed that low proportions of cancer patients were provided with subsidized/free diagnostic services on costly procedures like MRI (15%) as well as on less costly X-ray services (28%) [14]. Another study from Iran assessed the average laboratory cost for breast cancer treatment based on public tariff for every stage of breast cancer separately (i.e. stage I= US$5,113.84, stage II= US$42,534, stage III= US$38,943.77, and stage IV= US$69,361.95) that was relatively very high [15] but the present study findings identify that surgery (i.e. consultant fees and main ward bed occupancy) in both hospitals was fully subsidized and free of cost which is partly contradictory to the aforesaid Indian and Iranian findings. However, the current study found that medication costs used for surgery were solely borne by the target patients which is in line with the findings of a study, undertaken in Pakistan, concluding non-availability of medicines in public sector health care facilities [16].

Chemotherapy usually refers to the use of medicines or drugs to treat cancer, which is an expensive therapy for the patients of a developing country like Pakistan. According to the patients, chemotherapy drugs were available free of cost in the Mayo hospital, but they had to purchase them from open market whenever these were out of stock. Therefore, a nominal amount (US$9.34) was spent by the patients to avail chemotherapy medications. Conversely, it was observed that patients of the Jinnah hospital had to pay US$467.05

fully OOP for these medicines. The aforesaid patients' statements regarding the contradictory OOP expenditures on chemotherapy medicines in the target facilities were also confirmed by the authors' observations that management of the Mayo hospital was running organized support section to facilitate the patients under treatment in terms of supplying expensive medications like chemotherapeutic agents. Moreover, manual book keeping was maintained by the nursing staff and supervised by senior doctors and patients were facilitated without any discrimination. However, lack of such section and facility for chemotherapy patients were found in Jinnah hospital. Hence, patients were better served at Mayo hospital regarding the chemotherapy component of breast cancer treatment.

The present study findings regarding chemotherapy may be related to outcomes of other research endeavors; researchers found public hospital disaggregation of expenditures where a major proportion of funding went for non-development expenditures like salaries and administrative costs (i.e. 61%) while they found 10-48% share of drugs and supplies [18]. Moreover, it was observed in India that each patient's chemotherapy session costs up to US$1636 [25]. Furthermore, a study revealed that free of cost chemotherapy was provided to a lower number of patients in public sector tertiary care hospitals of India [14]. A hospital in Bikaner (Rajasthan) was the only one providing 50% of the patients with completely free or partially subsidized chemotherapy [14]. It is concluded that subsidies regarding expensive medical tests and medicines may reduce the monetary burden of patients' households.

The direct medical cost burden on breast carcinoma patients was found considerably higher in Jinnah hospital patients as compared to Mayo hospital. The reasons behind the higher costs in Jinnah hospital patients include the unavailability of chemotherapeutic agents. Though spending on privately opted investigation procedures was common issue in both cancer care facilities, it was found overwhelmingly high due to lower quality report results, delayed appointment dates for tests and unavailability of machines. On the contrary, spending by the patients on radiotherapy facilities was zero in both cancer care facilities.

Conflict of interests

The authors declare no conflict of interests.

References

1. Kumar S, Imam AM, Manzoor NF, Masood N. Knowledge, attitude and preventive practices for breast cancer among health care professionals at Aga Khan Hospital Karachi. J Pakistan Med Assoc 2009;59:474-78.
2. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. CA: Cancer J Clin 2011;61:69-90.
3. Khan MO. The necessity of awareness of breast cancer amongst women in Pakistan. J Pakistan Med Assoc 2009;59:804.
4. Ferlay J, Soerjomataram I, Dikshit R et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer 2014;136:359-86.
5. Stewart B, Wild CP. World Cancer Report 2014. World Health Organization, 2014.
6. Kankeu HT, Saksena P, Xu K, Evans DB. The financial burden from non-communicable diseases in low-and middle-income countries: a literature review. Health Res Policy Systems 2013;11:31.
7. O'donnell O, Van Doorslaer E, Rannan-Eliya RP et al. Who pays for health care in Asia? J Health Econom 2008;27:460-75.
8. Malik AM, Syed SI. Socio-economic determinants of household out-of-pocket payments on healthcare in Pakistan. Int J Equity Health 2012;11:51.
9. Government of Pakistan, Ministry of Finance. Pakistan Economic Survey, 2016.
10. World Bank. Health expenditure per capita (current US$), Data. Available from: http://data.worldbank.org/indicator/SH.XPD.PCAP [Accessed 30th March 2017].
11. World Health Organization. GHO, Health expenditure ratios, by country, 1995-2014, Pakistan. Available from: http://apps.who.int/gho/data/view.main.HEALTHEXPRATIOPAK [Accessed 30th March 2017].
12. Yusuf A. Cancer care in Pakistan. Japan J Clin Oncol 2013;48:771-5.
13. Zaidi AA, Ansari TZ, Khan A. The financial burden of cancer: estimates from patients undergoing cancer care in a tertiary care hospital. Int J Equity Health 2012;11:1.
14. Nair KS, Raj S, Tiwari VK, Piang LK. Cost of treatment for cancer: experiences of patients in public hospitals in India. Asian Pac J Cancer Prev 2013;14:5049-54.
15. Davari M, Yazdanpanah F, Aslani A, Hosseini M, Nazari AR, Mokarian F. The Direct Medical Costs of Breast Cancer in Iran; Analyzing the Patient's Level Data from a Cancer Specific Hospital in Isfahan. Int J Prev Med 2013;4:748-54.
16. Shaikh BT. Quality of health care: an absolute necessity for patient satisfaction. J Pakistan Med Assoc 2005;55:515-6.

17. Islam A. Health sector reform in Pakistan: future directions. J Pakistan Med Assoc 2002;52:174-82.
18. Lorenz C, Khalid M, Akhtar N. Costing Structure of Public Hospitals in Pakistan. Pakistan J Med Health Sci 2011;5:403-7.
19. Malik S, Zameer A, Khaliq IH, Uzair L. Determinants of Consumer Satisfaction at Supermarkets: An Empirical Study from Pakistan. Science Int (Lahore) 2016;28: 625-31.
20. Sharp L, Timmons A. The financial impact of a cancer diagnosis. Natl Cancer Registry Ireland, 2010.
21. American Cancer Society. Cancer Staging [updated 30th March 2017]. Available from: http://www.cancer.org/treatment/understandingyourdiagnosis/staging [Accessed 16th January 2017].
22. Rosenthal R. Meta-analytic procedures for social research (Volume 6), Starika MR (Ed), Sage Publications, New Delhi, India. 1991;6:1-168.
23. World Bank. GDP per capita (current US$), Data [updated 30th March 2017]. Available from: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=IR [Accessed 30th March 2017].
24. Nazir T, Islam A, Taha N, Nazir SU, Chaudhary MA, Iqbal M. Review of Pharmacy Professionals and Drug Jurisprudence to Achieve the Millennium Development Goals in Punjab Province of Pakistan. Indian J Pharmaceutic Educ Res 2015;50;1-4.
25. Sharma EK. Killer costs. business today in [Internet]. 2017 [cited 30th March 2017]; Available from: http://www.businesstoday.in/magazine/features/cancer-treatment-cost/story/191785.html